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**Ichthyological Notes.**—In the *Bulletin of the Bureau of Fisheries* (vol. 25, 1905), Dr. Barton W. Evermann has a beautifully illustrated memoir on the "Golden Trout of the High Sierras." In small streams tributary to Kern River, along the flanks of Mount Whitney are found small trout, very gorgeously colored, with brilliant golden and orange shades on the bodies and fins. These colors harmonize with the orange colors of the underlying rocks. Recently Dr. Evermann, at the request of President Roosevelt, conducted an investigation of these trout. He finds them probably descended from the Kern River Trout (*Salmo gilberti* Jordan), but modified in size, in coloration, and in the reduction of the scales. From the Kern River Trout, the Golden Trout are separated by impassable waterfalls. But still more remarkable is the fact that in each of the three different streams thus isolated, there is a different type or species of Golden Trout. Besides the original species, *Salmo aguabonita* Jordan, from South Fork of Kern River, Evermann describes two new species, closely allied to this, but each sprung independently from the same parent stock. These species are: *Salmo roosevelti* Evermann, from Volcano Creek, and *Salmo whitei* from Soda Creek.

It is not certain whether the vivid colors of each of these three species are protective, due simply to natural selection, or whether to some more obscure influence acting on all individuals in these mountain brooks. The paper is illustrated by paintings by Charles B. Hudson and by maps and photographs of the waterfalls and streams within the habitat of the Golden Trout.

In the same *Bulletin* for 1904, Dr. Charles Wilson Greene of the University of Missouri has published his studies of the physiology of the Chinook Salmon, a species of especial interest from the fact that every individual dies after reproduction.

In the *Smithsonian Miscellaneous Collections*, 1905, vol. 48, Mr. Barton A. Bean gives an account of the Whale Shark (*Rhinodon typicus*), the largest of the sharks, a specimen of which has been lately taken on the coast of Florida. The same shark has been described from the Gulf of California as *Micristodus punctatus*, and lately from Japan as *Rhinodon pentalineatus*.

In the same number, Dr. Theodore Gill gives an essay on the Cyprinoid fishes, with figures of numerous species and a discussion of the vernacular names current in England and America.

In the *Proceedings of the Washington Academy of Science*, Robert E. Snodgrass and Edmund Heller record the fishes taken about the

Galapagos Islands by the Hopkins-Stanford Expedition of 1898; 184 species are recorded, with synonymy and valuable notes on their characters and geographical distribution. The new species has been described in a previous paper.

In the same *Proceedings*, Mr. William F. Allen, also of Stanford University, describes in great detail the lymphatic system in the large Californian Sculpin or Cabezon, *Scorpenichthys marmoratus*.

In the *Proceedings of the Royal Society of Edinburgh*, Dr. Louis Dollo describes the abyssal fish, *Bathydraco scotiae*.

In the *Proceedings of the Biological Society of Washington* (1905) Dr. Seth E. Meek, records a collection of fishes from the Isthmus of Tehuantepec. *Cichlasoma zonatum*, from Oaxaca, is described as new. Dr. Meek also describes two new species, *Pimelodella eigenmanni* from Sao Paulo, Brazil, and *Anisotremus williamsi* from Santos.

In the *Proceedings of the Philadelphia Academy* for 1905, Mr. Henry W. Fowler discusses a collection of ninety species of fishes from the Baram Basin in Borneo. Most of these are fresh-water species, several new genera and species being described. One goby, *Gigantogobius jordani*, allied to *Eleotris*, reaches a length of 26 inches.

Numerous papers in the *Annals and Magazine of Natural History* by C. Tate Regan, treat of fishes. The following matters may be noted: Regan records the European shark, *Hexanchus griseus*, from Japan and concludes that the Californian species, *Hexanchus corinnus* is not distinct from it. He gives reviews of various groups of South American fishes, especially Cichlidæ and Loricariidæ. A new white-fish, *Coregonus gracilior*, is described from the Lakes of Cumberland. A monographic review of the family Galaxiidæ is given by Mr. Regan in the *Proceedings of the Zoölogical Society of London*.

Dr. George A. Boulenger, as President of the Zoölogical Section of the British Association for the Advancement of Science (1905), discusses in illuminating fashion the distribution of African fresh-water fishes. In the *Annals and Magazine of Natural History*, July, 1905, Dr. Boulenger gives a list of the fresh-water fishes of Africa with the distribution of each species. In the *Proceedings of the Zoölogical Society*, he records the fishes of Lake Chad. All the species are common both to the Nile and the Niger, a fact which indicates that a connection between these rivers formerly existed through Lake Chad.

In the *Scientific Investigations of the Fisheries of Ireland*, for 1905, Messrs. E. W. L. Holt and L. W. Byrne, give a "First Report on the Fishes of the Irish Atlantic Slope." A new species is *Melamphaes eurylepis*. *Nettophichthys retropinnatus* of Holt is shown to be the young of the eel, *Synophobranchus pinnatus*. The genus *Myctophum* in this paper is called by the much later name of *Scopelus*.

Professor Keinosuke Otaki, and his associates, Fujita and Higurashi, continue their beautifully illustrated work on the fishes of Japan. In the third issue are included the Kurodai (*Sparus schlegeli*), the Maguro, or Tunny (*Thunnus schlegeli* = ? *Thunnus thynnus*), the Maiwashi or Japanese Sardine (*Sardinella melanosticta*), the Konoshiro (*Konosirus punctatus*), and the Common Goldfish or Funa. The press work in this series is beautifully done, and the text is accurate and helpful.

In the *Journal of the College of Science* (vol. 20, 1905) of the Imperial University of Tokyo, Shigeho Tanaka has an account of two new species of Japanese Chimæras. It is a remarkable fact that of the ten known living species of this ancient and extraordinary genus, five are known from Japan only, and the center of distribution of each of these is Sagami Bay, which is the first indentation south of the Bay of Tokyo. Mr. Tanaka describes *Chimæra jordani* and *Chimæra owstoni* as new species, in addition to the three, *Chimæra phantasma*, *Chimæra mitsukurii*, and *Chimæra purpurascens* already described from the waters about Misaki. When we consider the number of rare or ancient sharks recorded from this region, the extraordinary richness of the Bay of Sagami in shark-like types becomes very apparent. It was from Sagami Bay that Garman obtained *Chlamydoselachus* and *Mitsukurina* the "Goblin Shark," called *Mitsukurina*. In the same bay is a *Rhinachimæra*, a *Heterodontus*, and many species of Squaloid sharks, one of them with luminous areas on the body.

Other Japanese sharks are described by Garman in the *Bulletin of the Museum of Comparative Zoölogy* (vol. 46, 1906). These are: *Parmaturus pilosus*, *Centrophorus acus*, *Centrophorus tessellatus*, *Acanthidium rostratum*, *Acanthidium aciculatum*, and *Centroscymnus owstoni*. To *Parmaturus*, the Japanese species, *Pristiurus eastmani*, is also referred, as also *Catulus xaniurus* from California. Garman refers the genus *Deania* to the synonymy of *Acanthidium* and *Zameus* to that of *Centroscymnus*. *Squalus uyatus* of Italy is referred to *Centrophorus*. Garman describes *Hemigaleus pectoralis*, as a new species from the New England Coast.

Japanese fishes are also discussed in several papers in the *Proceedings of the United States National Museum* for 1905. Jordan and Seale describe six new species from different parts of Japan, the most notable being a new genus, *Sayonara*, near *Anthias*. The fishes of the islands of Yaku and Tanega, as collected by Robert V. Anderson, are recorded by Jordan and Starks. Seven of these, mostly blennies, are figured as new. Jordan and McGregor describe as new, the Japanese Threadfin or Agonashi, *Polydactylus agonasi*. Jordan reviews the sand-lances of Japan, and Jordan and Snyder review the sturgeons. An elaborate paper on the many species of flounders and soles of Japan is by Jordan and Starks. Jordan and Herre review the Japanese herrings, and Snyder the Japanese surmulletts. Jordan and Snyder discuss the Giant Bass of Japan, *Stereolepis ischinagi*, a species closely related to the California Jewfish, and *Erilepis zonifer*, the huge Aburabodzu or Fat-priest of Japan. This species was first known from a single specimen taken by Lockington in the Bay of Monterey.

Jordan and Snyder discuss the killifishes of Japan, and also the Chinese loaches of the genus *Misgurnus*. The fishes of Shanghai are discussed by Jordan and Seale, and those of Port Arthur by Jordan and Starks. Among the latter is a remarkable new genus of gobies, *Ranulina*, with the teeth fringe-like about the rim of the mouth.

Mr. Edwin C. Starks reports on the collection of fishes made in Ecuador and Peru, by the late Mr. Perry O. Simons, a most promising Stanford student, conducting explorations for the British Museum, who was murdered by highwaymen in Bolivia in 1899. In the same *Proceedings*, Dr. Evermann and H. W. Clark describe three new species from Santo Domingo, *Platypacilus perugiæ*, *Platypacilus dominicensis*, and *Sicydium buscki*. Eugene W. Gudger discusses the breeding habits and embryology of a species of pipe-fish, *Syngnathus floridae*.

In the *Proceedings of the Davenport Academy of Sciences* (vol. 10, 1905), the memorial volume dedicated to Mrs. Putman, the honored patron of the Academy, Jordan and Seale discuss the fishes of Hong Kong. This paper is beautifully illustrated, two of the plates being colored.

In the *National Geographic Magazine*, 1905, Dr. Hugh H. Smith treats in detail of the Japanese fisheries.

In the *Zoölogisches Jahrbuch* for 1905, is a paper by the late Professor Franz Hilgendorf of Berlin on fishes from East Africa.

Dr. Robert Collett, in the *Forhandlinger Videnskabs Selskab* of Christiania for 1905, continues his monographic reviews of the fishes of Norway.

In the *Pacific Monthly*, Portland, April, 1906, Jordan describes in popular fashion the trout and salmon of the Pacific, with drawings by Sekko Shimada.

In the *Popular Science Monthly* for April, 1906, Jordan records the occurrence in considerable numbers at Avalon in Southern California, of the Japanese Hirenaga or Yellow-fin Albacore, *Germomacropterus*. This large game fish, known by its citron yellow finlets occurs also in Hawaii.

In the *Paris Bulletin d'Histoire Naturelle*, Dr. Jacques Pellegrin discusses the fishes of Lake Baikal, known as Cottocomephorus.

In the *Journal of Sciences of Lisbon*, 1904, Dr. Balthazer Osorio has a catalogue of the fishes of Cape Verde, and in the same journal are various notes on other fishes.

In the *American Naturalist* (vol. 39, 1905), Miss Julia Worthington discusses the Myxinoids or hag-fishes, as studied by her at the Stanford Seaside Laboratory at Pacific Grove. Miss Worthington rejects the genus *Polistotrema*, detached from *Eptatretus* (which she calls by the much later though more familiar name of *Bdellostoma*), regarding the number of gills as having barely specific importance. The separation into genera may be questionable, but there is as yet no adequate reason for placing all these variant forms in a single species, an arrangement first suggested by Dr. Howard Ayers.

In the *Bulletin of the American Museum of Natural History*, Mr. L. Hussakof gives a valuable account of the structure of two species of *Dinichthys*. In the *American Journal of Science*, Dr. C. R. Eastman makes a strong argument in favor of the dipnoan affinities of the *Arthrodires*. He goes far towards placing Woodward's view of the case on a sound foundation. The contention of Eastman rests largely on the intimate relationship of the dipnoan *Neoceratodus* to the *Arthrodires* on the one hand and to characteristic dipnoans on the other, the living genus *Neoceratodus* being more primitive than either of the extinct types with which it is compared. Dr.

Eastman does not believe that dipnoans are descended from Crossopterygians, but rather that they may have come from the Pleuracanthus-like sharks. The association of the Arthrodires with the Dipneusti, finally disposes of the group of Placodermata, in which the Arthrodires were associated with the Ostracophores.

In the *Bulletin of the University of Montana*, Dr. James A. Henshall gives a list of the scant fish fauna of Montana, 36 species being represented, with notes on the game fishes represented or introduced into the State.

In the *Hawaiian Forester* (vol. 2, 1905), Mr. Alvin Seale gives an account of the successful introduction from Galveston to Honolulu of three species of mosquito-eating killifishes. These are *Mollinnesia latipinna*, *Fundulus grandis*, and *Gambusia affinis*. These fishes were received in fine condition, and they have shown great avidity in freeing Hawaii of her worst insect pest.

In the *American Journal of Physiology*, 1905, Professor G. H. Parker discusses the stimulation of the integumentary nerves of fishes by light. The sensitiveness to light of the vertebrate skin is established. This trait may have served as a basis from which the retinal structures and the temperature sense were derived.

In the *Marine Biological Association Report* (vol. 1, 1903), are elaborate studies of the Plaice, *Pleuronectes platessa*. Dr. William Wallace has investigated the growth rate of the species. Walter Garstang reports on the topographical distribution of the species. A number of studies on the natural history of the Plaice are recorded in German by Mr. Garstang in *Rapports du Conseil International pour l'Exploration de la Mer*, 1905.

In *Ergebnisse der Schwedischen Südpolar Expedition* (vol. 5, 1905) Dr. Einar Lönnberg describes and figures numerous new Antarctic fishes. Lönnberg also furnishes (*Kong. Vet. Aarsbog*, 1906) biographical sketches of the Swedish ichthyologists, Petrus Artedi and the late Fredrik Adam Smith (1839-1904).

In the *Archivos do Museu Nacional do Rio de Janeiro* (vol. 13, 1906), Alipio de Miranda Ribeiro records the vertebrates of Itatiaia, Brazil, and gives a review of the species of the Characin genus *Megalabrycon*.

In the *Journal of Anatomy and Physiology*, Mrs. Onera A. M. Hawkes of the University of Birmingham describes the important

discovery of a vestigial sixth branchial arch in the shark, *Heterodontus*. As in the more primitive groups of *Hexanchidæ* and *Chlamydoselachidæ*, there are six or seven gill arches, this discovery of six arches in the still more ancient group of *Heterodontidæ*, the oldest of existing sharks, is a matter of much interest and importance. The number five found in all other recent sharks is apparently a matter of specialized reduction.

In the *Annals of the New York Academy of Sciences*, 1906, Dr. Raymond C. Osburn makes a strong and convincing argument for the theory of the origin of the vertebrate limbs from fin folds. Dr. Osburn contends that paired and unpaired fins in fishes are similar structures and that the evidence is overwhelmingly in favor of the origin of all fins as local outgrowths from the body wall.

DAVID STARR JORDAN

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## BOTANY

**Leaf Structure.**—A paper by Mrs. Clements,<sup>1</sup> which contains a historical review of the work previously done along similar lines, is based upon observations made on some 300 species growing under the varied conditions presented by the Colorado foothills and the mountains of the Pike's Peak region of the Rocky Mountains. The conclusions arrived at support the views now generally held as to the influence of local conditions upon the histological structure of leaves, and are based upon exceedingly extensive and precise measurements relating to water-content of soil, humidity, light, and temperature, all of which factors are brought into relation with the histological structure of stem leaves. Thanks to the system of classification adopted as well as to the numerous comparative tables, the reader, at a glance, is able to note with exactitude the influence of each of the factors upon leaf structure, in which he is aided by a large number of excellent illustrations.

The statement: "Full sunlight is equally strong throughout the regions, and not more intense for high altitudes, as is generally supposed" [p. 28] is to be noted, in view of Professor Wiesner's recent conclusions to the contrary.

H. HUS

<sup>1</sup> Clements, E. S. "The Relation of Leaf Structure to Physical Factors." *Trans. Amer. Micr. Soc.*, 1905, pp. 19-102, 9 pls.